FLITECAM

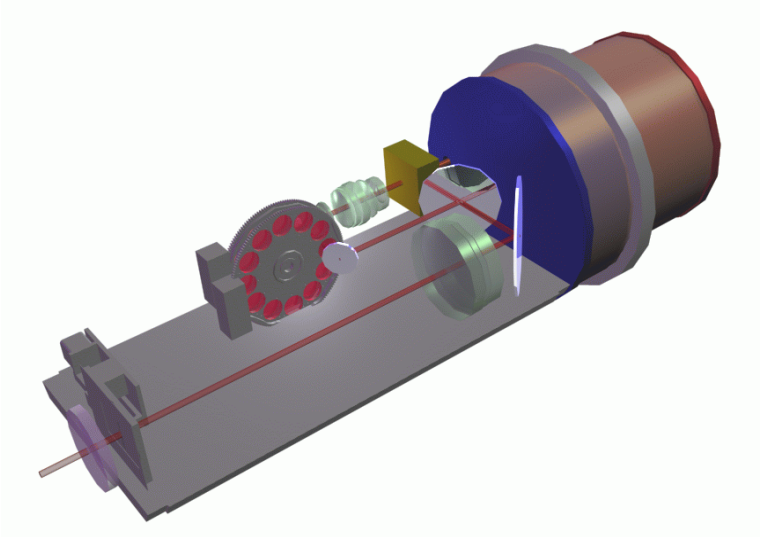
First Light Infrared Test Experiment CAMera

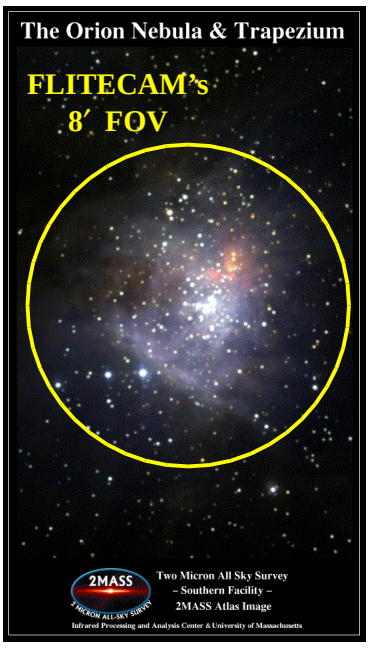
A Facility Class Instrument on SOFIA
for test purposes and science applications

UCLA

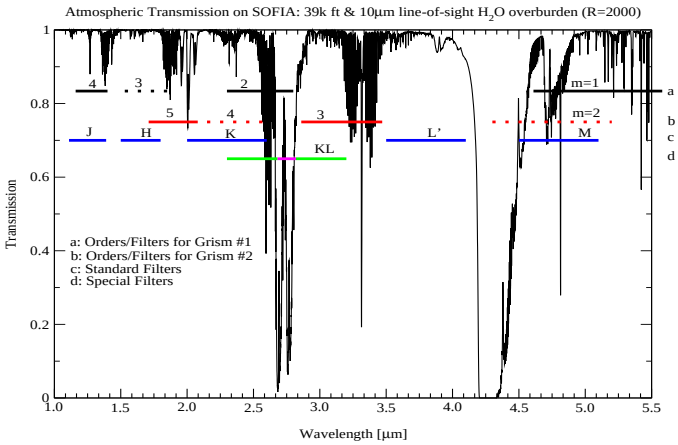
FLITECAM is a multi-purpose near-infrared camera operating from 1 - 5.5 μm and will be flying on the airborne observatory SOFIA (Stratospheric Observatory For Infrared Astronomy). FLITECAM is designed to

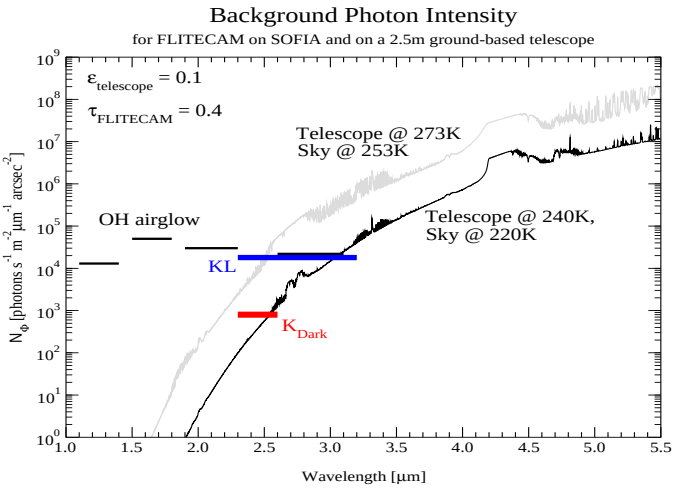
1. Test the SOFIA telescope assembly imaging quality
   - The PSF will be resolved: The air turbulence at the telescope door will degrade the imaging quality for wavelengths below 5 microns. Somewhere between 1-5 microns, it is expected that SOFIA will become diffraction limited
   - Black spots of less than 1 mm diameter can be detected by looking at the pupil
   - Exhaust plume effects will be investigated. They occur when SOFIA will be operating at very low telescope elevations. Spectroscopy modes have been implemented to observe CO_2 - and other lines at moderate (R $\simeq$ 1000 - 2000) spectral resolutions
   - The spectroscopy mode will be used to observe unsaturated water lines, and calibrate the SOFIA water vapor monitor, a SOFIA work-package, being built at NASA Ames Research Center
2. Provide seeing-limited imaging from 1 - 3 microns and diffraction-limited imaging from 3 - 5.5 microns to cover science applications motivated by good atmospheric transmission and low thermal background
   - Narrow-band imaging, i. e. Pa α (1.88 μm), or Br δ (1.96 μm)
   - For broad-band imaging wide filters will be available for deep integrations in the K- and L-band
3. Conduct various science projects with moderate resolution spectroscopy from 1 - 5.5 microns
   - With our resolution, solid ice features can be distinguished from gas-phase features
   - Many atomic and molecular emission lines can be observed, for example: Pa α (1.88 μm), Br β (2.63 μm), C_2 (1.4 μm and 1.8 μm), C_2H_2 (2.0 μm and 2.6 μm), PAH features (3.4 μm)
4. Operate together with the Special Class Instrument HOPI (High-speed Occultation Photometer and Imager) on SOFIA to simultaneously
   - Allow observations of occultations at two visible wavelengths (HOPI) and one near-IR wavelength (FLITECAM)
   - Analyze the telescope performance at different wavelengths
5. Produce first-light images for public outreach





FLITECAM's Performance





FLITECAM Specifications

Detector	ALADDIN (InSb) 1024×1024 pixels
Read-Out Speed	$\lesssim$100 μs per smallest sub-frame (32×16 pix.)
	or about 15 read-outs per second for the full frame
Plate Scale	Low-Res.: 0.48″×0.48″
	High-Res.: 0.12″×0.12″
Field of View	Low-Res.: 8′ diameter
	High-Res.: 2′ diameter
Wavelength Range	1 - 5.5 μm
Spectral Resolution	R $\simeq$ 1000 - 2000
Camera Throughput in imaging modes	$\simeq$ 0.4
Smallest detectable black spot @ pupil	0.8 mm

Point Source Sensitivity

5-σ in 1 h, Telescope @ 240 K, Sky @ 220 K, $\lambda/\Delta\lambda$=5

Band	J	H	K	K_{Dark}	KL	L	M
FWHM	3.5″	3.0″	2.5″	2.5″	2.5″	2.0″	2.0″
Mag	20.2	19.1	19.1	20.7	18.8	18.2	15.0

Line Sensitivity

S/N = 10 in 500 s, Telescope @ 240 K, Sky @ 220 K, $\lambda/\Delta\lambda$=2000

Band	J	H	K	K_{Dark}	KL	L	M
FWHM	3.5″	3.0″	2.5″	2.5″	2.5″	2.0″	2.0″
W m^{-2} (-20)	13.1	16.4	7.6	1.7	6.5	7.1	39.2

The FLITECAM Team

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